Storm Sewer Screening Project
Annual Summary 2001

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Introduction

Clark County's National Pollutant Discharge Elimination System (NPDES) permit requires pollutant screening for stormwater outfalls and storm sewer lines as a basic monitoring (S5.B.4) and illicit discharge elimination tool (S5.B.g). Special condition S9.C.4 of the July 1999 permit called for Clark County to implement the screening project by July 31, 2000. This report summarizes year two (2001) of the storm sewer screening project.

Project goals in 2001 included the following:

1) Revisit high priority screening points which exhibited dry weather flow or possible illicit discharges during year one (2000) monitoring.
2) Screen for several types of illicit connections or discharges to the storm sewer system at locations where storm sewer mapping crews discover dry weather flow.
3) Add data to the stormwater database and link results to existing GIS storm sewer maps.

Storm sewer screening is a preliminary tool which will not necessarily identify all illicit pollution sources. Since pollutant discharges to storm sewers are often brief or intermittent, screening will not identify many small periodic pollutant discharges from illicit connections, spills, dumping, or other activities. However, screening is likely to identify storm sewers having substantial or ongoing illicit discharge problems.

Field work for Clark County's 2001 storm sewer screening project was initiated in June, 2001. The field season concluded Aug 31, 2001. A total of 49 sites were screened for illicit discharges, and 6 referrals were made for follow-up investigation of possible illicit discharges.

Rod Swanson is the project manager. Jeff Schnabel is the technical lead responsible for project implementation and reporting. Derrick Brooks was the field lead for 2001, responsible for field screening activities and data entry. Field assistance was provided by Ron Kerlin. Follow-up visits to areas with suspected illicit discharges were performed by Cary Armstrong.

Methods

Illicit Discharges Defined

According to the U.S. Environmental Protection Agency (EPA, 2000), an illicit discharge is any discharge to a municipal separate storm sewer system that is not composed entirely of storm water. These may include inappropriate piped connections of waste lines to the storm sewer system, or a variety of inappropriate activities that result in waste products or wastewater entering storm sewer inlets. However, screening programs are not required to address or attempt to eliminate certain types of non-stormwater discharges, including the following:

Water line flushing
Landscape irrigation
Diverted stream flows
Rising ground waters
Uncontaminated ground water infiltration
Uncontaminated pumped ground water
Footing drains
Lawn watering
Individual residential car washing
Discharges from potable water sources
Foundation drains
Air conditioning condensation
Irrigation water
Springs
Water from crawl space pumps
Flows from riparian or wetland habitats
Dechlorinated swimming pool water
Street wash water

Screening Point Selection

Initial screening sites for the 2001 sampling season were selected based on a review of the year 2000 results. Sites were visited if they ranked "high" for revisitation during 2000. Sites were ranked "high" based on: 1) proximity to industrial or commercial land uses, 2) presence of dry weather flow in 2000, or 3) discovery of suspected illicit discharges in 2000.

During the year 2000 sampling season, the second phase of the screening project consisted of a systematic examination of storm sewers on a section by section basis. The original objective was to continue this process during 2001. However, during the 2001 sampling season a separate crew began field mapping the storm sewer system. To conserve limited resources and eliminate substantial overlapping visits, the section by section inspection of storm sewers was eliminated from the illicit discharge screening protocol in 2001. Instead, the sewer mapping crew was instructed to note any occurrence of dry weather flow discovered in the storm system. These sites were referred to screening staff and subsequently monitored for possible illicit discharges according to the standard screening protocol.

Sampling Parameters

Sampling parameters were based primarily on the U.S. EPA 1993 Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems user's guide (EPA, 1993). The following list briefly describes the parameters included in the sampling program. Parameters marked with an asterisk (*) were recommended for inclusion by EPA. Additional parameters were also selected based on conversations with various agency staff involved with storm sewer screening projects in the Pacific Northwest. Chemical analyses were performed by North Creek Analytical Laboratories (NCA), a State of Washington Department of Ecology certified laboratory located in Beaverton, Oregon.

	Parameter	Method
Physical inspection:	*estimated flow rate	field observation
	*odor	field observation
	*color	Hach color wheel (office)
	*turbidity	Hydrolab (in field)
	*temperature	Hydrolab (in field)
	*floatables	field observation
	*deposits/stains	field observation
	*vegetation	field observation
	*damage to outfall	field observation
Chemical/Biological	*conductivity	Hydrolab (in field)
	*total chlorine	NCA lab
	*ammonia	NCA lab
	*pH	Hydrolab (in field)
	copper	NCA lab
	zinc	NCA lab
	enterococcus	NCA lab

EPA states that the recommended physical parameters will likely be the most useful indicators of illicit discharges. Taken in combination, they can indicate the presence and often the degree of contaminated flows. Chemical parameters were included to supplement the physical inspection parameters, as follows:

conductivity	Used to indicate presence of dissolved solids, and is also a general indicator of outfall contamination
total chlorine	Used to indicate potable water sources
ammonia	Used to indicate sanitary wastewater. EPA recommends testing for either potassium or ammonia.
pH	Extreme pH values may indicate commercial or industrial waste flows
copper	General indicator of metals contamination
zinc	General indicator of metals contamination
enterococcus	May indicate sanitary wastewater. Indicator of potential human health risk.

Copper, zinc, and enterococcus do not appear on the EPA recommended list. Copper and zinc are used by the City of Portland as basic indicators of metals contamination (Dirks, 2000).

Bacteria sampling is not generally included in illicit discharge screening protocols, but is included here due to the potential for human health impacts to recreational creek user's during the summer months. Enterococcus replaced fecal coliform in 2001 because the State of Washington will likely change its water quality standard from fecal coliform to either enterococcus or E.coli in the

near future. **Sites with high bacteria levels are not categorized as "illicit discharges" in this report**. Rather, they are addressed as a separate issue and will receive follow-up attention separately from the more traditional suspected "illicit discharges" (see page 8).

Several EPA suggested parameters were NOT included in initial sampling, as follows:

surfactants	Surfactants are recommended by EPA as an indicator of detergent pollution. NCA is not equipped to perform this analysis, and very few labs are willing to perform the analysis due to cost considerations. Cost would be $50/each and samples would consistently be analyzed outside of hold time since no local laboratories would perform the analysis. Performing the test in-house would require an additional equipment purchase of ~$1000, plus substantial staff time to run the analyses.
potassium	Potassium is used to distinguish between sanitary and potable water. EPA recommends including either potassium or ammonia. Ammonia was chosen due to its more widespread use as a water quality indicator.
fluorescence	Fluorescence is recommended by EPA as an indicator of detergent pollution. NCA is not equipped to perform fluorescence testing, therefore additional equipment purchase (~$1000) would be required, plus substantial staff time to run the analyses.
fluoride	Fluoride is used to indicate potable water sources in areas where water supplies are fluoridated. Clark Public Utilities does not add fluoride to their water supply, therefore the test would be irrelevant in most of unincorporated Clark County.
microtox screen	A microtox screen is used to evaluate relative toxicity. The cost is prohibitive for widespread use in this program ($127 each), but the test could be used for certain outfalls if other testing indicated a high likelihood of major toxic contamination.

Quality Control/Quality Assurance

NCA is a State of Washington Department of Ecology certified laboratory located in Beaverton, Oregon. Laboratory QA/QC procedures were conducted according to NCA's approved QA/QC manual (NCA, 1997). Samples were collected in properly cleaned bottles supplied by the laboratory. Bottles were labeled in the field using waterproof pens with project name, site number, date, and time. Chain of custody documentation was prepared for each sample set and is on file at the Water Resources section.

Field equipment was calibrated prior to each sampling event as per manufacturer's instructions. Field data were recorded using waterproof pens and paper. Hydrolab data were manually recorded on field sheets.

Field Methods

Prior to each field trip, proposed sampling sites were identified on field maps and a tentative route planned.

Water Resources field staff attended the standard Clark County flagger training course prior to the 2001 sampling season. For safety reasons, a minimum of two staff persons were present at each sample point. Staff wore regulation orange safety vests at all times and utilized traffic cones as necessary in high-traffic areas. At the discretion of field staff, pre-selected sampling sites could be modified or eliminated if on-site conditions were deemed unsafe.

Fluorescent orange paint was used to mark hard-to-find or potentially confusing sampling locations.

All 49 sites visited in 2001 had been visited previously in 2000, and digital photos of most sites were already on file. In 2001, photographs were generally taken only where an illicit discharge or other contamination problem was suspected. Location photos for use in the site database were also taken at any sites not photographed in 2000.

Physical observations, water samples, and Hydrolab field meter readings were collected at all sites having sufficient flow to enable sample collection. Appendix 1 is an example of the field data collection sheet used for this project.

Water samples were collected by one of three methods depending on site conditions: 1) direct immersion of sample bottles, 2) a long-handled sampling dipper, or 3) a small electric water pump. In some cases, a temporary check-dam was placed in the channel in order to create a pool deep enough to enable sampling. Water depth was often insufficient to enable in-situ use of the Hydrolab equipment. In these cases, water was collected in a bucket or with the long-handled dipper and the Hydrolab probe immersed in the container.

Database

Screening data and associated site photos are stored in the NPDES database. A detailed description of the database functions is contained in a separate user's manual. The database can create reports for specific sites or site visits.

Illicit Discharge Follow-up

The storm sewer screening project does not normally perform the follow-up investigations and technical assistance to eliminate illicit connections or discharges. Suspected problems are referred to Stormwater Program Technical Assistance staff for further action. Referrals and follow-up visits are recorded and tracked within the NPDES database. Referrals and follow-up visits for 2001 are summarized in the results section and in Appendix 2, respectively.

Results

Overall

Full results from each screening site may be found in the NPDES database. Staff visited 49 sites between June 1, 2001 and August 31, 2001. Figure 1 and Figure 2 show the general location of the 49 screening sites. Stormwater outfalls with sufficient dry-weather flow to enable sampling were found at twenty of the 49 sites. Several additional sites with flow were eliminated from the screening because they were actually piped stream crossings rather than county stormwater outfalls. Staff observations and water quality samples indicate that water at the majority of the sampled sites came from the allowable sources listed in the Illicit Discharges Defined section (e.g. groundwater springs, lawn watering, etc).

There were no referrals from the storm sewer mapping crew in 2001. This is likely because the mapping crew was working primarily in residential areas where illicit discharges are rare. Additionally, many areas covered by the mapping crew in 2001 utilize dry wells instead of pipe systems to convey stormwater. Therefore, most runoff enters the ground leaving very little dry weather surface flow.

Results from the 20 screening sites where water samples were collected are summarized in Table 1. Six potential illicit discharges were referred to follow-up staff based on field visit information or chance observations by field staff en route to selected screening points:

1) Site #807: evidence of possible intermittent discharges from auto shop.
2) Site #839: thick oil sheen in catch basin, standing water on pavement, and soapy water being discharged to storm drain from auto shop and car stereo dealer.
3) Site #847: roadside ditch with oily sheen near restaurants and oil change business.
4) Site #872: water with high temperature and high conductivity in discharge from industrial gas facility.
5) Yard maintenance crew observed blowing large amount of grass clippings into gutter outside business park.
6) Horses with unrestricted access to ditch in headwater stream.

Table 2 shows the number of sampled sites exceeding state water quality standards or showing positive results for selected parameters (based on the 20 sites where water samples were collected). Positive results for a given parameter do not necessarily indicate that an illicit discharge is present or suspected, but rather give an overview of basic water quality at a site. Criteria marked with an asterisk represent Washington Class A water quality standards.

As evidenced in Table 1 and Table 2, water quality conditions at screened outfalls have not necessarily correlated highly with potential illicit discharges. Among the 6 referred sites in 2001, only one site (Site #872) was referred specifically because of measured water quality constituents. The rest were referred based on visual observations of the area surrounding the outfall, not based on conditions at the outfall itself.

Bacteria

Notable among the results in Table 2 is that 11 sites exceeded EPA's criteria for a single grab sample tested for enterococci bacteria. Though bacteria is not a traditional parameter in illicit discharge screening programs, it has been included due to the possibility of human health risk arising from summertime recreational use of Clark County water bodies. These 11 sites will be

referred to county technical assistance staff and/or health agencies for follow-up investigation along with the six more typical illicit discharge referrals listed above. Screening Project staff will likely take part in the further investigation of sites with high bacteria counts.

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Table 1. Summary data for the 20 screening sites where water samples were collected in 2001.

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Table 2. Constituents present in dry weather discharges from 20 sampled storm sewer outfalls, 2001.

2001 Referral Visits

Cary Armstrong, Clark County Waste Reduction Specialist, performed the technical assistance follow-up visits for the 2001 sampling season. Actions taken at each of the six referred sites in 2001 are summarized in the Addendum found in Appendix 2.

Comparison to 2000 Referrals

Based on two years of project implementation, the rate of improvement at suspected illicit discharge sites is encouraging. Most sites with suspected illicit discharges in 2000 showed satisfactory conditions when re-visited in 2001.

Two of the six referrals for potential illicit discharges in 2001 were also referred in 2000. Site #807 required an additional follow-up visit because the 2001 site visit found evidence that poor BMP practices may still be taking place at that location, albeit to a lesser degree than when initially discovered in 2000. Site #872, located just outside BOC Gas at the Boomsnub Superfund site will likely represent an ongoing problem. Ecology officials are responsible for ongoing cleanup activities at the site and have been notified each year regarding illicit discharges to the county's storm sewer system from this location.

Conditions at the remaining sites with suspected illicit discharges in 2000 (see year 2000 report) had improved by 2001:

#204: visual inspection showed no evidence of discharge
#685: sampled, no evidence of illicit discharge
#794: no dry weather flow
#803: no dry weather flow
#804: no dry weather flow
#2015: sampled, no evidence of illicit discharge

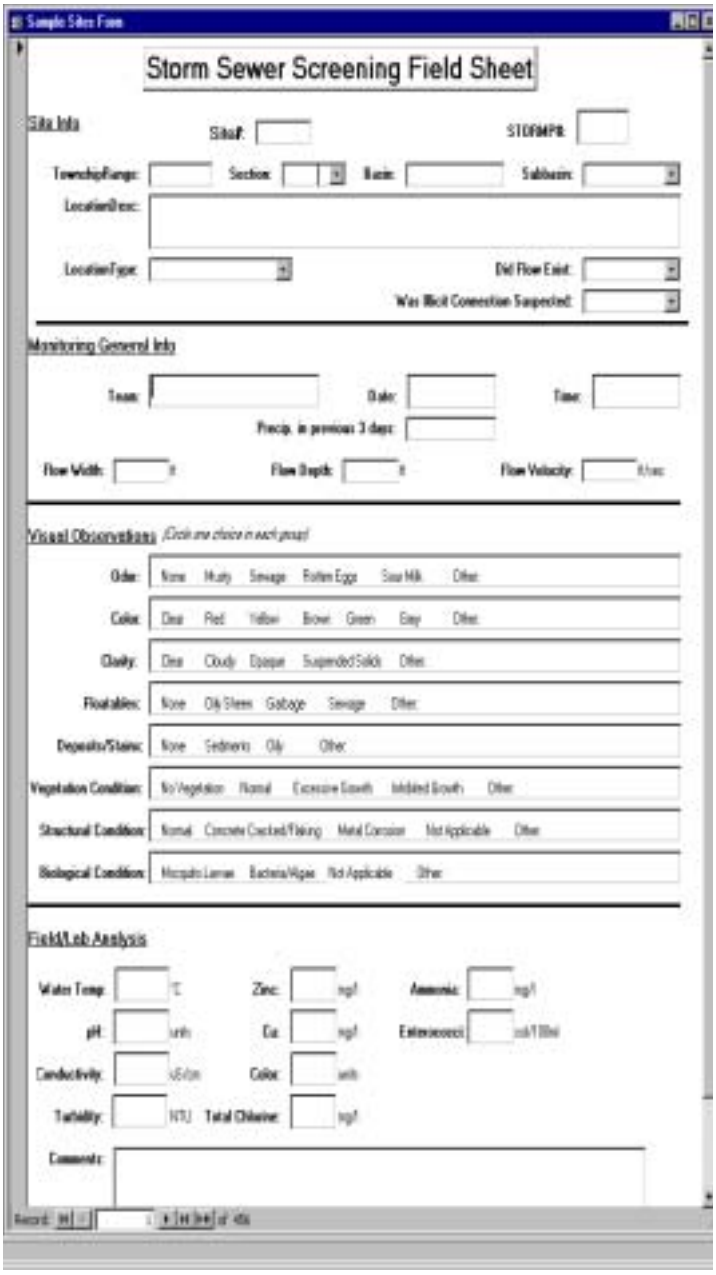
The four remaining referred sites from 2000 were based on chance observations by project staff en route to other sites. All four of these sites received follow-up attention during 2000. Subsequent visits by staff indicated satisfactory cleanup results.

Project Modifications for 2002

Project implementation in 2002 may be modified pending changes in the county's NPDES permit requirements. Initial sampling in 2002 will include re-visiting the 20 sites where samples were collected in 2001, as well as visits to the location of each 2001 and 2000 illicit discharge referral. The project may also be expanded to include dry weather screening for specific pollutants as part of the county's contribution to Total Maximum Daily Load (TMDL) development for local 303(d)-listed waterbodies.

As noted in the results section, few screening sites have been referred for follow-up investigation based on results of laboratory water quality testing. Given this fact, it may be reasonable to limit the use of laboratory water quality testing in future years. Since laboratory analysis of samples is expensive and time consuming, the protocol may be modified so that samples are sent to the laboratory only when an illicit discharge is suspected, instead of as a standard procedure for every site. On-site water quality analysis using portable meters, combined with visual observations of the site appears to be adequate to detect areas that require follow-up attention.

APPENDICES



Appendix 1: Example 2001 screening field sheet.

Appendix 2

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Addendum

Business Education and Outreach
For
Storm Sewer Screening Referrals

Prepared by
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October 2001

Introduction

Storm sewer screening test sites that were found to have illicit connections or discharges were referred to Cary Armstrong for follow-up visits. There were six referrals made during the 2001 storm sewer screening project.

Methods

Visits were made to each storm sewer site that was referred as an illicit connection or discharge by either Jeff Schnabel or Derrick Brooks. When the connection or discharge was obvious and I could visually see the pollutant or business, I would make my technical assistance visit to that business. If the storm sewer with the illicit connection or discharge was in an area where there were no obvious signs of source, I canvassed the area to educate all the businesses in the area on proper stormwater pollution prevention. I also explained what we were finding, where we were finding it and steps they could take to prevent any pollutants from entering the storm sewer system.

Site - Results

1) Site #807: Adjacent to 1205 NE 95th Street Vancouver

Evidence of possible intermittent discharges from an auto shop. This site was also referred in 2000.

This site in 2000 had black goop coming from an outfall pipe into a county's storm system. Doug Arnold and I performed a dye test on a floor drain in Harlen's Drywall Co. The dye test showed the drain was plumbed to sanitary sewer.

A technical assistance visit was also made to H & M Auto and Truck Repair because there was evidence of illicit discharge stains coming from this business and flowing into the parking lot catch basin that was connected to the outfall pipe in question.

In 2001, H & M Auto and Truck Repair was revisited and education on BMPs was repeated. Signs of illicit discharge stains still evident but nothing fresh.

2) Site #839: End of Anderson Road west of Hwy 99 Vancouver

Thick oil sheen in catch basin, standing water on pavement, and soapy water being discharged to storm drain from auto shop and car stereo dealer.

There is a large hole in the asphalt just east of the storm drain that collects all the water and pollutants before filling up and draining into the catch basin. Pollutants such as oil, antifreeze and soapy water found intermittently.

Precision Tune AutoCare at 6900 NE Hwy 99 has an oil / water separator just east of the building that according to the owner has not been maintained in the five years he has been there. A follow-up visit was made with Doug Arnold from the Hazel Dell Sewer District to perform a dye test on the oil / water separator. The dye test shows the oil / water separator was piped to the county's storm sewer. I am now talking to the owners of the property to have them re pipe the oil / water separator to the sanitary.

There are several other automotive related businesses in the same complex, many with floor drains and with the owners help we are trying to find out if they all drain to the same oil / water separator or to sanitary.

Finally, there is a Schuck's automotive parts store parking lot that also drains to the hole in the pavement and eventually to the storm sewer catch basin. Many customers perform their auto repairs in the parking lot dumping their oils, antifreeze, brake fluid, etc. in the parking lot, which ends up in the catch basin after a rain. The manager is aware of the problem and he agreed to put up additional signage on his storefront. He has also put out a kitty litter absorbent to soak up the fluids.

3) Site #847: Southeast corner of Hwy 99 and 61st Street.

Roadside ditch with oily sheen near restaurants and oil change business.

The water flowing from the pipe at this location was running clear both times when follow-up visits were made. Currently, I am not sure of the source of the water but will continue to make follow-up visits to the site. There is a Les Schwab Tire Store in the vicinity. I stopped in to review the BMPs for their industry activities and made them aware of what we were finding.

4) Site #872: Near NE 78th Street and 47th Avenue.

Water with high temperature and high conductivity in discharge from industrial gas facility.

This site is near the BOC Gas plant on existing Boomsnub Superfund site. Dee Williams at Washington Department of Ecology, who is the Ecology contact person for this cleanup site, was given the results of the storm sewer screening.

5) UPS property on NE St. Johns Road and 68th Street.

Yard maintenance crew observed blowing large amount of grass clippings into gutter outside business park.

I met with the maintenance supervisor for this UPS property. I showed him the photographs of the grass clippings in the road, which had quite an impact and he assured me it wouldn't happen again. I reviewed the BMPs for landscaping activities and then was given a tour of their entire facility. BMPs for truck washing, refueling and maintenance were also given.

6) Site #240: NE Baker Creek Road, just north of NE 174th Street.

Horses with unrestricted access to ditch in headwater stream.

This site was referred to Clark County Conservation District and Natural Resources Conservation Service for possible follow-up with hobby farm BMP instruction.

Outcomes

In cases where there was an illicit connection to the storm sewer, I am working with the business and Hazel Dell Sewer District to have the business connect to sanitary sewer. In most cases however, education on how the storm sewer works and giving Best Management Practices (BMPs) for preventing pollutants from entering the storm sewer system were provided. Follow-up to each of the businesses will be ongoing to ensure compliance with the Water Quality Ordinance.

Enforcement

At this time, no cases have been referred on to Code Enforcement, but if a business neglects to implement the required BMPs in a timeline agreed upon, that business will be referred to Clark County Code Enforcement for enforcement action.

References

U.S. Environmental Protection Agency. January 2000. Storm Water Phase II Final Rule: Illicit Discharge Detection and Elimination Minimum Control Measure. EPA 833-F-00-07, Fact Sheet 2.5.

U.S. Environmental Protection Agency. January 1993. Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems: A User's Guide. EPA/600/R-92/238.

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North Creek Analytical. November, 1997. Quality Assurance Program, Revision 9.